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Interventions for information systems introduction in the NHS

Stuart Maguire and Udechukwu Ojiako

This article provides a historical review of five long-term interventions which were undertaken within the NHS. The objective of the exercise was to examine how information systems (IS) were introduced into operational environments. The length of the interventions ranged from 9 months to almost 3 years. The five sites were all at different stages of system development and the research was carried out using a combination of participant observation and action research. The research question asks, 'How can organizations think about and hence go about their information provision in such a way that successful IS are introduced?'

Keywords

informatics, methodologies, systems

Introduction

This article examines, by intervention exercises carried out over a period of time, the introduction of information systems (IS) in a large and complex organization. For this particular work, the National Health Service (NHS), regarded as both a large and a complex organization [1–3], is used as a case study for the interventions. The article, building on earlier work by May et al. [4], aims to contribute towards a better understanding of the IS introduction process from inception through to system evaluation and review. Five long-term interventions were undertaken in a range of NHS sites, examining different aspects of IS introduction.

The output of the research is an identified set of factors that should be addressed when introducing IS within large and complex organizations such as the NHS. The approach has been reflective and has been directed at understanding the environment which has led to repeated failures within the NHS's £12.4 billion National Programme for IT (NPfIT), of which parts have now been rebranded Connecting for Health. In particular, reports have been published [5] which suggest that senior health managers within the NHS have lost faith with the programme's ability to advance the NHS IS implementation trajectory.

The research confronts the theory that identifies IS introduction as a predominantly technical area. As a result, an agenda is put forward which suggests that IS introduction is far from being a technical speciality; rather, successful introduction is seen to be dependent on addressing softer issues. It is hoped that the outcome of the research will be a situation in which effective IS are introduced while taking into account the behavioural, cultural, and organizational issues that are so important within large and complex organizations.

This research is not specifically seeking to add to an accepted existing body of knowledge but is rather of a preliminary reflective nature, seeking to reflect on the full complexity of systems introduction.

The IS projects in the NHS have to be desirable and feasible from several different perspectives. There are multiple stakeholders with vested interests in the outcomes of these projects. Failure to understand the complexity of this process may lead to future financial and organizational problems. This article is intended to identify a range of specific areas that need to be addressed in advance of any future IS project in the NHS [6].

In order to study IS introduction in large and complex organizations, five long-term interventions were conducted across a range of NHS sites. Following recommendations by Atkinson [7], the interventions were regarded as a means of ensuring that, when a suitable approach to IS introduction is being developed, individual and social considerations are on the agenda not merely as sources of information requirements or the needs of end users. The length of the interventions ranged from 9 months to almost 3 years.

Historical context

For nearly two decades, the NHS has absorbed a series of major changes. It is within this strategy for meeting modernization objectives within the NHS that the NPfIT [8] is being implemented. Although we are now more than halfway through the 10 year programme of IS overhaul and upgrade which began with the NHS Plan in July 2000, the research was initiated at a time of major change within the NHS.

The government intends that the NPfIT change programme will bring modern computer systems into the NHS to improve patient care and services. Over the next decade, it is expected to give patients and healthcare professionals access to their personal health and care information, thus transforming the way the NHS works. To support this change, effective and rigorous IS introduction structures and processes are being put into place and developed. This process has been set up by the NHS and outside agencies to drive and manage ambitious and challenging targets in terms of the purchase of systems and services. It will also ensure that the resulting products and services will be implemented at a local level and that the ultimate benefits to patients and the NHS will be delivered through local ownership and changed working practices.

The NHS is a phenomenally large and complex organization [1, 2]. It has a budget of £96 billion for 2006–07 [9] and employs over a million staff, making it the largest organization in Europe and the third largest in the world [10]. In terms of complexity, it provides around 2 million consultations and approximately 10 million clinical decisions each day.

The NHS has a complex structure. Responsibility in Scotland, Wales and Northern Ireland belongs to the devolved administrations, while in England the government through the Department of Health is politically responsible for NHS operations, which are run by the Strategic Health Authorities (SHAs).

The NHS is characterized by constantly changing and evolving non-linear relationships, structures and interfaces which are often difficult to determine. Central to this change within the NHS is the softening of traditional professional boundaries and the increased use of improved technology and service redesign, which will underpin its ability to share high-quality information effectively between teams and organizations to provide safer patient-led care.

Based on this, it is safe to assume that change is not new to the service and a number of major reorganizations have characterized it since its inception. Moreover, the pace and intensity of the changes have left NHS managers with little time for consolidation or reflection.

To be able to operate in such a fluid and dynamic environment, the NHS requires accurate information to carry out its functions. It is therefore essential that the NHS sees information technology and systems (IS&T) as the key to support the provision of this information. The general trend in such circumstances has always been to manage such complexity by establishing a strong centralized organization which hopefully could lead to synergies and opportunities for effective collaboration. It is interesting to note that Chapman [11], who sees the NHS and other public service organizations as not just complex systems but essentially complex adaptive systems interacting in a social system, suggests that the introduction of learning processes rather than centralized policy initiatives is the key to allowing the NHS to remain competitive and innovative in healthcare service delivery. It is also important to note that this view is shared by the British Computer Society (BCS), which has backed calls for a technical review of the NPfIT, while questioning whether the scheme's centralized approach will work in the complex structure of the NHS [12].

One problem which Chapman [11] identifies with such systems is an inevitable centralized policy initiative aimed at trying to solve problems by isolating different parts of the system rather than seeing the connections between them. A connections view would lead to the introduction of learning processes rather than detailed targets, with the aim of providing a minimum specification which allowed innovation and new solutions to emerge. He sees centralization as characteristic of the way NHS reform has been approached, and points to spending increases as an unintended consequence.

The value of IS and their introduction

As we enter the twenty-first century, we have witnessed the development of ever more advanced information and communications technology (ICT). Due to increased commercial and competitive demands, it is essential that the new technology and systems are introduced effectively, in a way that enhances how business operates and competes.

IS serve as a core intellectual component of any organization's resilient infrastructure. They refer to the collection of resources from which organizations can draw business conclusions. Their management represents a process of guidance and control through the introduction and manipulation of scarce resources in order to enable their efficient use.

The effective introduction of IS as a shared and critical corporate resource will support management making decisions, reducing costs, and meeting business, legal and accountability requirements which ultimately will lead to the achievement of organizational objectives. The result is the recognition that information as a resource must be managed just like other vital organizational resources such as finance, manufacturing and personnel. It should be noted that this research will concentrate on the introduction rather than the implementation of IS within a large and complex organization.

IS introduction is about ensuring that new and changed systems are successfully introduced into an existing technical space or environment using project management principles. These have been recognized, for example through work done by Norris [13] and Bowns et al. [14], as being a major value adding driver to healthcare information management and systems. For this to be successful, it is essential that the stability of existing systems is maintained and that there is minimal impact on the outputs of existing services. The objective is to ensure that there is no disruption to the customer's service. It also involves ensuring that in-life support requirements are adequately addressed to support the new and changed services.

To achieve this objective, it is the role of IS introduction to ensure that client concerns about possible interference with service levels or an actual loss of service are addressed prior to the new or upgraded system going live. The IS concept recognizes the fact that prevailing conditions within organizations inherently mitigate against establishing an agile and entrepreneurial IS culture. This culture is expected to deliver consistently high client satisfaction, best-in-class cost leadership, and secure and resilient systems on demand. The expectation is that this is fully addressed before, during and after the upgraded or new systems are introduced. One such factor, identified by Atkinson [7], is the need to ensure that introduction methodologies are not based on frozen-in-time user requirements. Figure 1 shows a basic systems introduction framework.

What has to be noted is the fundamental difference between IS introduction and deployment. IS deployment is concerned with technical implementation and with ensuring that new or upgraded systems are able to be integrated within the infrastructure space with minimal problems. On the other hand, systems and technology introduction primarily focuses on the user's and customer's experience at the point that the new systems or technology are being adopted within the organization.

The research findings will show that there is a need for more explicit recognition of the inherent organizational characteristics that influence the introduction of new systems.

The research approach

The problems associated with introducing agile, best-in-class, secure and resilient IS into the NHS has been made more difficult because the NHS has continued to operate in a rapidly changing environment [15]. This has resulted in a need to identify frameworks that encompass important issues such as risk so as to ameliorate the success rates of future implications. From the research approaches perspective, this means that we have to identify a research methodology that will maximize learning in a dynamic and multifaceted area.

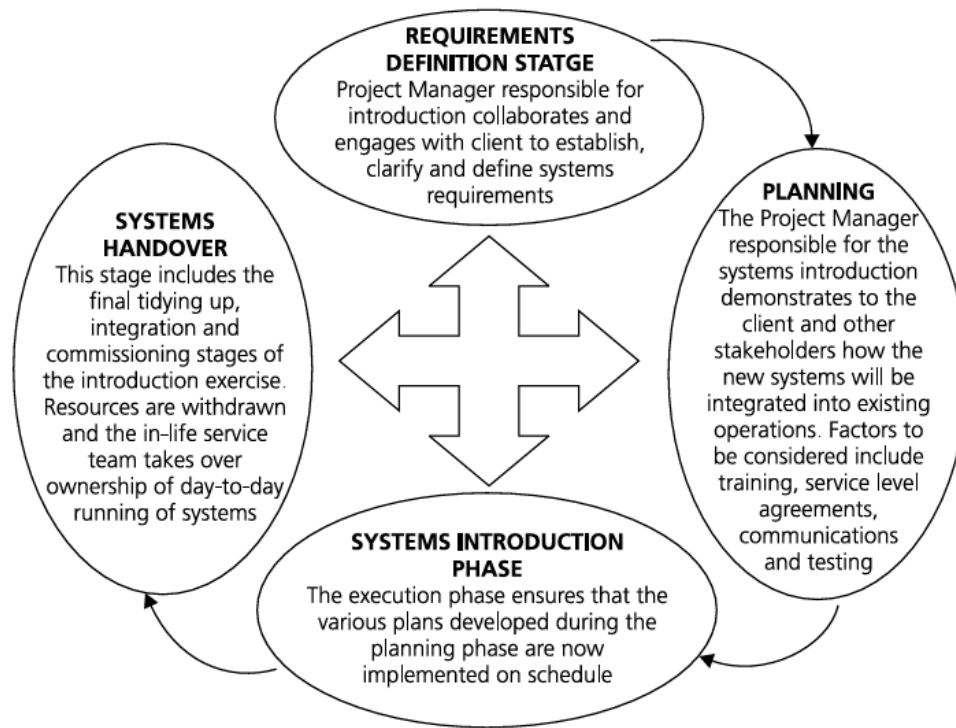


Figure 1 The IS introduction framework

The research was undertaken in a way that conforms to participatory observation/ action research (PAR) which involves practitioners as both subjects and co-researchers, based on the proposition that causal inferences about the behaviour of human beings are more likely to be valid and enactable when the human beings in question participate in the building and testing process [16]. In such a research approach, the researcher becomes part of the arena being studied, with an explicit concern for developing findings that can be applied in the organization [17].

The research approach which was adopted was participant intensive, leading to what we have referred to as an *intervention*. Papworth and Crosland [10], who have identified various characteristics of *whole systems interventions* such as their temporal nature and short life spans, point out that these research approaches (which emerged from the 1950s and 1960s) are increasingly being used in the NHS.

We however did not adopt the whole systems intervention approach they proposed. We felt that viewing entire organizations as *whole systems*, and hence ignoring local environmental and operational conditions, was not appropriate for the work we intended to carry out, especially considering the size and organizational complexity of the NHS. The participant observation/action research methodology as applied to this particular study is based on work done by Checkland and Holwell [18]. In Figure 3 we diagrammatically represent the reason that such soft systems methodology (SSM) has been identified as the most appropriate for this research. We particularly note that if the research into IS development had been viewed as concentrating on the issues shown in Figure 2, i.e. in the areas of hardware theory etc., a positivistic approach may have been seen as the most appropriate [19].

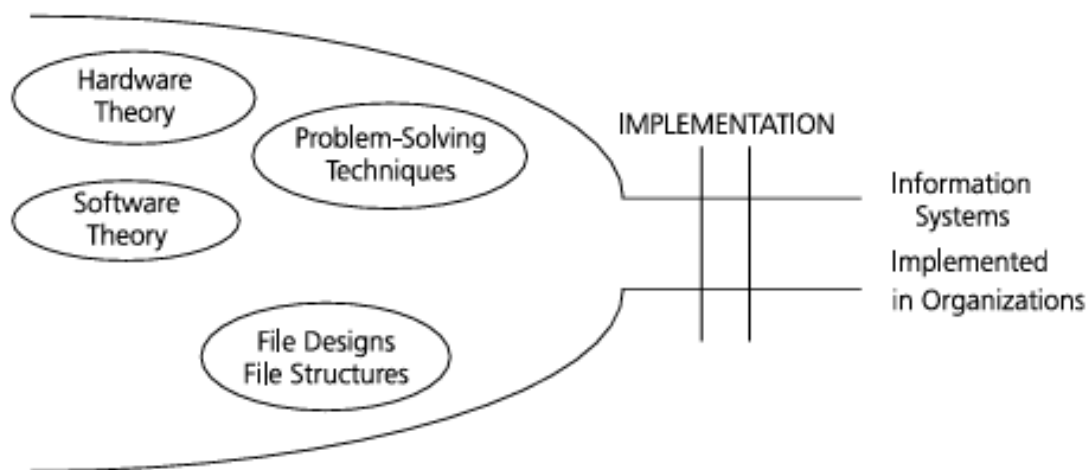


Figure 2 From a 'product-led' to a 'market-led' view of agile, best-in-class, secure and resilient IS development

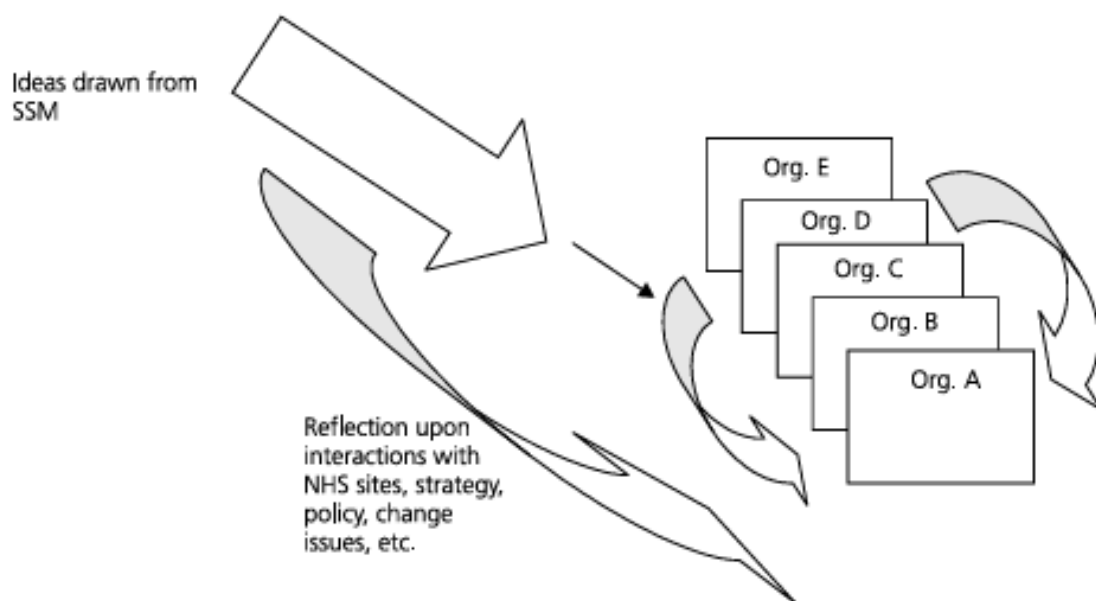


Figure 3 The interaction between the various research sites

The overlap in the research at the various sites in principle allowed for interaction between various NHS organizations. This interaction between the various research sites is reflected in Figure 3.

The various project timeframes overlap. Learning from one research site can be fed back into the others. The sites are also at different stages of understanding about these complex issues. This is expressed in Figure 4. The process shown allows a comparison of the theory and practice of information system introduction. It makes it possible, in principle, to produce materials that will support the introduction of IS into the NHS. The research area reveals a large number of very different systems issues relevant in trying to improve the effective introduction of information into the NHS.

The timing of this work is apposite. It is expected that the total NHS spend on IS could well reach £40 billion over the next decade [20]. This has coincided with a growing concern that there is a widespread failure to deliver benefits on the part of IT-based IS via the NPfIT.

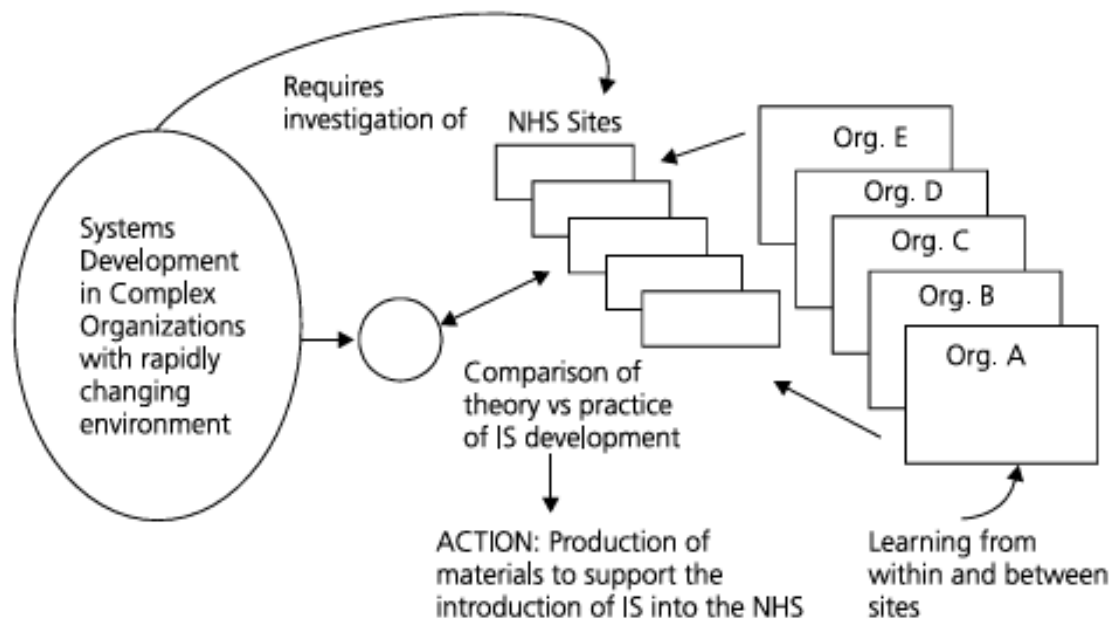


Figure 4 Learning from different sites

The interventions

The experiences detailed in this section result from five interventions carried out at NHS sites in the north of England. Apart from exercises carried out during the early stages at the first site (organization A), the interventions were carried out at the same time.

Each NHS site is described in terms of its structure and the organizational processes it undertook. The sites were also analysed in terms of the various NHS roles that they performed. The NHS environment in which the organizations worked was also considered. The interventions were undertaken at a time when the various sites were undergoing major change. Their external environments were also changing dramatically. This inevitably had an effect on the way that they reacted to changes within their organizations.

The five research projects examined how the various sites undertook the provision of information support for staff undertaking organizational activities. In each case this provision led to organizational change. The research sought to extract how these organizations undertook and managed the change process. The activity undertaken at the five sites generated a series of experiences which were analysed and hence became the source of the learning from the sites described in later sections of this article.

Figure 5 embodies the methodological thinking and constitutes a basic conceptualization of the research context. It represents a 'light' structuring of the research approach, one which is intended to provide coherence without preventing the emergence of particular lessons at a particular site.

It has already been stated that the overall objective of this research was to 'clear the ground' for the development of an approach to IS introduction at NHS sites. With this in view the aim of the fieldwork was to explore existing action to introduce IS, using the model shown in Figure 5 as a structuring device. What follows is the result of doing this at the five sites covered in this research.

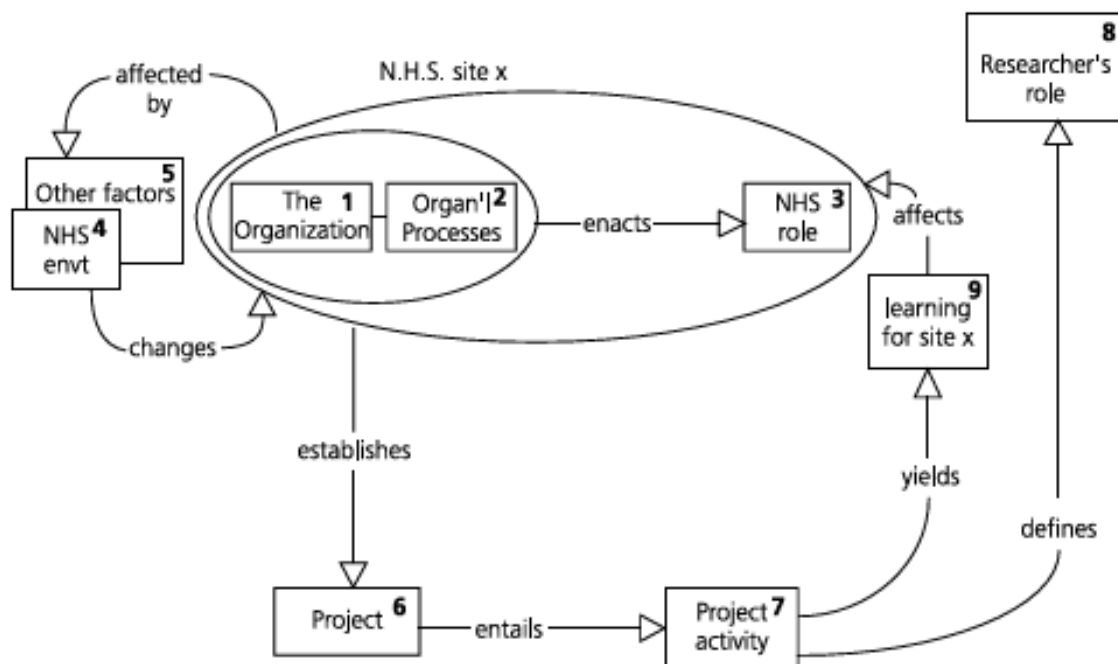


Figure 5 Basic conceptualization of the research context

Organization A

Organization A offers acute healthcare services for approximately 240,000 people living in its catchment area in the northern part of England. The trust was officially formed on 1 April 1994 – one of the fourth wave of NHS trusts. The majority of services are provided at two local hospitals in the area, with additional facilities in community hospitals which provide locally accessible outpatient and X-ray services.

The project evaluated the introduction of a community-based staff record computer system called COMCARE. The project aimed to evaluate the effect on the community nurses in the locality of the introduction of the computer system.

The project also tried to identify the aims and objectives of the system and whether these were being met. It was hoped that substantive learning could be gained about the IS introduction process as well as methodological learning about the way the intervention was undertaken.

A review of the information system introduction did indicate that the participation of the users was minimal and it was to be expected that their perceptions of the system were negative. Lack of participation in the information system introduction led to frustration on the part of the nurses. The longer the system had been introduced, the less the community nurses used the system. In some cases the nurses completely disregarded the output from the system.

The nurses were omitted from the change process, so they were in no position to find out about or influence the technical qualities of the new system. This inevitably led to a lack of understanding of the system, especially as the training given was found to be ineffective. The majority of the community nurses interviewed did not understand the intricacies of the new system and this had a detrimental effect on the rest of their work. All this had a negative impact on staff morale.

The main concerns surrounding the introduction of the computer system within organization A concerned the lack of involvement of the nursing staff in the overall process. Nursing staff did not feel any ownership of the system that they were destined to use.

Organization B

Organization B provided the opportunity for an intervention in an organization that was taking an IT-led approach to IS introduction but that also had little or no experience of the system introduction process. The dynamic environment in which the trust was working required effective IS that were capable of providing timely and accurate information to support management in its new responsibility. It was believed that organization B provided an ideal opportunity to intervene within a developing site.

The project within organization B focused on the introduction of a system preceded by information requirements analysis. The organization had simultaneously introduced hardware and software in other areas and this formed the basis for their information strategy. The project's objectives were to try and foster the cultural change of passing on the *ownership* of information to the respective managers of the organization. The project attempted to set in motion a method by which the unit could produce an information requirements analysis for the whole organization. This particular project could not address the information requirements for the entire unit because of its limited time scale. The aim was to exemplify a process of using models (expanded to any level of detail) to identify the information requirements and information flows. This process could then in principle be applied by organization B to include all the functions/activities carried out within the organization.

From the intervention exercise, it became clear that there was a general lack of involvement of staff in the system introduction processes within organization B. A 'hardware-led' approach to information provision had developed partly due to the fact that there was an over-reliance on outside providers. There was a general view held by staff that IS were imposed on the organization without any prior consultation with the key stakeholder group.

Organization C

Organization C was one of the national pilot sites for the Hospital Information Support System (HISS) initiative. This acute unit was given the opportunity of introducing a totally integrated, hospital-wide information system. However, this was being introduced at a time when the hospital was also going through a period of major change.

The aim of the project was to identify the importance of effective project management for the introduction of large and complex projects. It was hoped that data could be collected on whether HISS supported the business plans of the organization. It was also hoped to reveal whether HISS satisfied any strategic objectives.

It became clear that one of the problems with the introduction of HISS was that organization C had failed to grasp the fact that wherever possible information system introduction should attempt to anticipate the requirements of the organization in future years. HISS as a result was unable to reach its full potential, i.e. through interfacing with GP practices or other NHS organizations. Failure to look towards this environment meant a devaluing of HISS potential for organization C.

There was no real understanding of which stakeholders would eventually benefit from the introduction of HISS. Organization C at that time had no history of introducing information systems projects on this scale. Using a formal, structured approach to system development did not guarantee its success.

Organization D

Organization D was a health purchasing authority. This organization has also undergone a number of major changes during this research. Like most purchasers it has amalgamated with the local family health services authority (FHSA). It decided to implement another of the major national initiatives, the Developing Information System for Purchasers (DISP). This was implemented at a time of major internal change and uncertainty. During the period of the research a major redundancy programme was also undertaken.

The implementation of the DISP system involved major organizational change and so was an ideal opportunity to gain further learning about the IS introduction process. The project also allowed an intervention at a time when cultural and political realignments were taking place within the organization.

The onset of DISP meant that there would be a staged consolidation of the old systems. Eventually, where there had been three operators of the old systems there would be one member of staff predominantly involved with DISP. It was hoped that the new system would break down the barriers of the three providers and that a new culture of sharing data would emerge. Unfortunately, this approach had a detrimental effect on morale during and after the implementation of the system. What may have been termed friendly rivalry when the previous systems were being used turned to alienation when the new system went live. For example, one user of the new system did not wish to take annual leave because she didn't want another member of staff to amend her files. DISP should allow contract managers to view any current file.

For the new system to have been successful, the providers of the data should have been part of the system. The system boundary for the DISP system, however, had been drawn around the purchaser site; this meant that staff at the provider sites did not feel part of the new system. They did not have ownership of either the new system or the data that went into it. A significant number of staff at organization D believed this to be why the quality of data was so poor. This led to further alienation between those staff providing the data and those who were analysing it. As the success of the system depended upon accurate data, the system boundary should have been drawn around the provider sites. This would probably have led to improved accuracy of data at source.

The introduction of the new system at organization D was a major change process for all the staff involved. It was important that this change was handled in a sympathetic way, for it was very difficult to get the staff at organization D to change their view of the contracting process. It was also very difficult to get staff used to sharing data. Information had not been seen as a key resource with the old system.

If the new system had been introduced efficiently there would have been fewer issues concerning change. However, there were many problems with software and with the actual installation of the system. Staff were able to make comparisons between the old and the new system. Most staff felt that they had more control over the old system. Four weeks of parallel running was planned. In the event only 5 days actually took place. There was general agreement that this was not long enough for a system of this complexity.

Organization E

This particular project involved the evaluation of a data interchange and comparison scheme. The project was set up for the collection, analysis, and dissemination of morbidity data within primary care in organization E. The project was designed and developed by a small group of staff within the NHS. If the project was successful, it was anticipated that similar projects could be set up within other NHS organizations. The system was rolled out to GP practices within the area.

It was difficult to justify the investment on the system in purely cost-benefit terms. Initially, the system was not flexible enough to provide practice staff with the information they required to make informed decisions about resource allocation. The quarterly (later 6 monthly) feedback report which was sent to all practices within the scheme was reliant on accurate data for its effective use in planning, but more than half of the practices believed the data going into it was inaccurate.

Learning from the sites

The previous section appraised the experiences of the various interventions within NHS organizations. This section interprets the key findings from the five research sites utilizing the following seven perspectives:

- the management of change
- human resources management and training
- identifying strategic benefits
- the organizational environment
- user involvement
- systems introduction
- return on investment.

The management of change

The system introduction at the five research sites all had one key similarity in that they all led to major change situations within the five organizations. In some cases these changes were far reaching. Within organization C, the system was intended to be fully integrated, which resulted in changes in procedures and working practices within and between different departments. Within organization A, the new system replaced a manual system that had been working satisfactorily for many years.

What became clear from the various sites is an assumption that because a system had been successfully introduced in another organization within the NHS, it could then be successfully introduced into any other NHS organization. This however seemed to be a rather ambitious assumption to make since the NHS as an organization is not homogeneous, and in fact most departments do exhibit their own characteristics and culture. Hence, even if the system had been implemented satisfactorily in another NHS organization there would be no guarantee that it would be successfully implemented in organization C.

Within the systems introduction exercise in organization A, many of the problems that arose were organizational and behavioural, not wholly technical, thus demonstrating the people emphasis in IS introduction. The role of the change agent in the whole process was given little attention. At organization B, no resources were devoted to change management issues even though there was no previous history of system introduction within that organization. Significant resources were given over to the 'product' – the system – but very few resources were given over to the 'process' – the successful introduction of the system into the organization. It was interesting to note that, even though all of the five sites had well-established human resource management departments, these had minimal involvement in the major change processes that were being undertaken within their organizations. This is surprising as most of the necessary support was required in the area that may be termed *organization development*.

There certainly had been no attempt to try and gauge whether resistance to change was going to be a key issue within the various system introduction exercises. The organizations differed widely in the amount of information they gave to staff in advance of the systems being introduced.

The feedback from the five sites was generally one of systems being imposed rather than being introduced in a sympathetic way. This led one to believe that these organizations lacked a fundamental understanding of how poor IS introduction methodologies can affect their employees.

Within organization A, for example, this actually manifested itself in a lowering of the quality of patient care, since using the system continued to take up valuable resources. There was also no monitoring within organization E of whether the new system had led to an improvement or deterioration in effectiveness within the GP practices.

The introduction of the DISP system within organization D also had a detrimental effect on staff. They had been used to a particular way of working which meant that they had a very good grasp of the previous system, which supported their work. The new system dramatically changed their working practices and reduced their productivity, which led to a lowering of morale. In two of the research sites, organizations C and D, some staff had been involved in the early stages when the choice was being made of which system should be procured. However, this involvement was minimal and appeared to raise expectations of a more substantial involvement once the introduction started. When this involvement was not forthcoming, staff felt more alienated towards the project. One common feature across the five research sites was that IS was being introduced in areas that had no history of using it. Not surprisingly this tended to have a dysfunctional effect on the various organizations as they were not able to assimilate the various changes that ensued.

At several of the sites, systems were promised by a particular date but were not delivered on time. This was sometimes measured in years rather than weeks and months. This was certainly the case at organization C. This led to further disillusionment amongst users as they were preparing for the changeover from the old to the new system. This only heightened the anxiety of changing from a system they had been using for several years to one that they were unsure of using. This led to staff not being fully informed of the changes that they may be confronted with when new systems are introduced. Staff at

organizations A and E did not feel that they had been informed of the changes the system would bring.

Recommendations: on evidence, more resources need to be put into the management of change when IS are introduced within the NHS systems space. At the same time, staff impacted by change should be encouraged to understand the implications of that change. For example, the suppliers of the system and consultancy to organization C admitted that they had no in-house experience of change management, and as a result failed to involve major stakeholders when the new system was being introduced. In addition, when budgets are being drawn up for the introduction of new systems and information technology, a significant proportion should be set aside to ensure that change management issues are sufficiently addressed.

Human resources management and training

Systems education and training are a major part of the IS introduction process, and can often be the difference between the success and failure of IS. In fact, according to Pfeffer [21], achieving competitive success through people involves fundamentally altering how we think about the workforce. This will usually involve regarding the workforce as a source of strategic advantage, not just as a cost to be minimized or avoided. Unfortunately, a common theme that ran through the research projects was the inadequate level of resources channelled into systems education and training and human resources in general.

The NHS organizations found it very difficult to transmit the message of what the training and education programmes being run were attempting to change, especially as in some situations the introduction of a new system led to a completely different way of working.

A common factor across all five research sites was that some staff were being asked to use computer systems for the first time as part of their new roles, resulting in understandably high levels of anxiety. In general, across all the organizations (with the exception of organization B) the training was either inadequate or ill-timed. This led to further disillusionment with how the overall change process was being managed.

Even those staff who were first to be given training on the use of the new systems complained that it was not of the appropriate quality, especially as training of staff was measured in number of hours and not in quality or level of competence achieved. This meant that in effect there was no attempt by training staff to foster a *learning environment*. Training was also seen to be one-directional, with no effort being made to collate feedback from trainers towards improving the training packages. There was no evidence at any of the research sites that training had been monitored. There was a general assumption that because training had been given to staff it must necessarily have been understood. There was a need to have at least qualitative measures of how successful the training had been at the research sites.

Recommendations: one realization which did arise on the issue of human resources management and training was the need for an appropriate education and training environment to be created, implemented and managed. For this to be effective, it is important to note that without a true learning environment, users and staff will experience an unengaging experience which will not support the proactive acquisition of expertise or address the IS&T requirements of the NHS.

Identifying strategic benefits

One of the major areas of change during this research project, and certainly one identified by Bowns et al. [14] as a major factor associated with success in the implementation of information management and technology in the NHS, was the way that organizations perceived the need to put in place a strategy in the systems area. Previously, these organizations had acquired IS when they thought it necessary. When a new or updated information system was required they would develop and introduce one. It is interesting to note that during the lifetime of the research the emphasis within the NHS seems to have included the move from the development of an individual site focused IT strategy to a general organizational IS strategy. The objective of this strategy appeared perhaps to meet a growing desire within the NHS to maximize economies of scale, while ensuring that the organization draws on its massive resources to reap any perceived benefits.

There were very few examples at the research sites of the technical staff being able to take a wider view of the business issues within their respective organizations. Similarly, there was little evidence to show that the business managers were willing to investigate how new IS and technology could increase effectiveness within their areas of responsibility. There was also scant evidence that users or systems staff were seeking to understand how new systems being introduced might be used in a strategic way.

Recommendations: as one of the major benefits put forward for introducing HISS and DISP was that these systems would be able to deliver strategic benefits, it is important that such developments are part of a wider strategy within an organization that ensures the true benefits from the systems introduction can be realized. Unfortunately, there was no evidence from any of the sites that this process had been undertaken. There also needs to be increased pressure within the organizations to ensure that management teams at the five sites do consider the implications of strategic alignment and not see systems introduction as a separate issue, isolated from the rest of the organization.

The organizational environment

Our work on the organization environment can be linked to previous work carried out by Martin et al. [22], which connected the everyday concerns of managing major IS projects with other important organizational considerations such as size, structure and system design within the NHS.

For our interventions, we do note that the organizational environments at the various sites were affected in different ways. For example, within organization A, the district nurses fed back that the new system they were expected to use undermined their relationship with patients. On the other hand, the new systems introduced into organizations C and D were implemented in a manner which gave very little initial thought to data and information flowing into and out of the organization. As a result, the new systems introduced did not satisfy current requirements in respect of the strategic need of the systems to drive a change in such a way that its relationships and boundaries could be understood. These findings reinforced the view that environmental scanning is a major problem for the majority of organizations which are introducing new IS.

Recommendations: one key recommendation is the need to ensure an understanding of the environment within which introduced systems are expected to operate. Such an understanding also covers a clear appreciation of the organization's culture, the human resources and skills of prospective users, support staff and operators (the micro environment), and also the macro environment of the organization. Failure to do so can lead to ineffective IS being implemented.

User involvement

The interventions re-emphasized the importance of user involvement in systems introduction and are in line with earlier findings from work carried out by researchers such as May et al. [4], Bowns et al. [14] and Harrop et al. [23]. The research however did indicate major failings as related to user involvement during the systems introduction across all the organizations. For example, although there was a project management team in organization C, it contained a very small percentage of eventual users. Organization D's project was *systems led*. There was even less involvement of potential users in the organization E project. This lack of involvement had an overall negative effect on user expectations of the new systems. At some of the sites, users were not involved in the requirements capture exercise. At other sites, users were totally excluded from the whole introduction process.

Recommendations: an improvement in the way the system introduction processes were communicated to users would have made them more prepared when the system finally went live. Instead their perception was that the system was owned by 'management', and it is very difficult to change such perceptions once they have been instilled within users. It might have been possible to mitigate this. One approach for example will be to get users more proactively engaged in the communications phase of the introduction process.

The research re-emphasized that increased user involvement at the earlier stages of systems introduction would lead to more effective systems at the sites where they had been introduced. There would have been a number of significant advantages to be gained

through involving users at the research sites, as staff at these sites could have played a prominent role at the early stages of analysis and design. User input at these stages could have been used to try to ensure that effective systems were delivered.

Systems introduction

Within organization C, for example, the key interface was not that between users and the IT department, but that between external suppliers and project manager. However, organization C's HISS project demonstrated the futility of a very long systems introduction project. It is also important to highlight that at all of the research sites there was a narrow focus on what were regarded as the key issues of IS introduction, usually assumed to be technical. It was also interesting to note that the project teams at the five research sites had a very narrow, technical focus, so that agendas normally focused on systems and technical issues. Unfortunately, there was no major attempt at any of the research sites to examine the impacts of softer, more human-oriented approaches to systems introduction, which could have engaged users and stakeholders.

Organization B, for example, did support one project that appeared to adopt a softer human-oriented approach. Although that project had been successful (in defining information requirements for a specialty) there was no attempt to extend this approach to systems introduced for the whole organization.

Perhaps because a key feature of staff at the five sites related to limited technical expertise, the system introduction process ended up being controlled by a small team of technical staff. It was very difficult for the staff at the research sites to understand the benefits of IS when they could see no direct link between the new system and improved decision-making, although work by Van Dijk et al. [24] does indicate that this positive relationship can exist. This situation unfortunately resulted in the process for system introduction across the research sites not being seen to improve the decision-making within the organizations. For example, at organization C there was a gap of 5 years between the requirements definition stage of HISS and the system handover stage. Within such a length of time the strategic requirements of the organization had changed dramatically.

Recommendations: the effect was that the interventions did reinforce earlier suggestions by Atkinson [7] that the traditional systems development life cycle approach is likely to be inappropriate to the needs of a large and complex organization working in a turbulent environment where agility and change are endemic. System introductions that take several years are rarely likely to deliver the benefits originally conceived. Large and complex organizations such as the NHS need to appreciate that smaller projects with the potential of delivering benefits in a shorter timescale should be given more prominence.

Return on investment

One common theme running throughout the research sites was the failure to take a strategic perspective with regard to the return on investment (RoI). This was particularly troubling as significant financial investments had been made in the projects, and it has long been accepted that increasing the level of capital investments in IS will positively impact not only on an organization's competitiveness [25] but also on the provision of healthcare [26].

The amount invested at the various sites ranged from several hundred thousand pounds to several million pounds. This represented a significant cost to the various organizations. Associated with each project were not just one-off capital costs, but also significant operational costs. There was little evidence at any of the five sites of any willingness to justify in financial terms the outlay on systems introduction, thus reinforcing the difficulty of justifying large investments in systems-related projects. This has been discussed by Ballantine and Stray [27], who examined techniques used by organizations to appraise IS. Bodin et al. [28] discussed the use of analytic hierarchy processes in making such analysis. Other researchers such as Irani et al. [29], Irani and Love [30] and Wainwright and Waring [31] also made similar recommendations.

Other questions which have also arisen and been discussed by other researchers include whether IS can actually help improve patient care [32, 33]. Several of the organizations were given extremely tight deadlines to meet with their system introduction. This meant they had little time to spend on trying to identify real benefits that might be derived from

the new systems. We found no evidence that the costs incurred on IS at the five sites could be justified on investment grounds. Both organization C with HISS and organization D with DISP were given unrealistic deadlines to implement the systems. Organization B procured their system in a short space of time because they thought it would support their trust application. There was no real evidence at the three sites that the investment in IS was linked directly with the organization's business plans; neither was there any evidence of a cost-benefit analysis, or business case, being undertaken at the research sites.

Recommendations: one of the points that has emerged from the review of the RoI is the need to encourage senior management to adopt a strategic perspective with regard to investments in the various IS. In effect, they should cease to regard IS cost as an avoidable or unnecessary cost. Although effecting a change in the perception of the cost of IS&T is an initiative that can contribute to the success of IS introduction, there needs to be a concurrent effort to ensure that an appropriate means of justifying and appraising financial investments exist. One particular advantage of going through this exercise is to be able to ensure that investment is channelled towards healthcare systems that will realize benefits for their users.

Conclusions and lessons

The traditional view of the organization as having clear boundaries, limited relationships and an internal focus on efficiency and effectiveness is no longer adequate. In today's complex organizations such as the NHS, blurred boundaries with clients and competitors are commonplace. There are increases in competition and restructuring because of deregulation, further globalization of the economy, a higher degree of uncertainty, and a faster pace of change; all this puts mounting pressure on managers. IS are also more varied, pervasive and cheaper than ever before. These changes mean that all complex organizations face greater challenges, especially as related to their introduction: the poor management of IS can become a serious liability and a limiting factor in an organization's ability to exploit its IS resources. Hence, for organizations to exploit their IS capabilities, they must be able to adopt an introduction approach that is based on an optimum synergy between internal capabilities, external relationships, organizational culture and human resources strengths.

There is no doubt that the NHS sees IS as crucial in the provision of quality patient care. This view is supported by a suggested correlation between investing in IS and improvement in patient healthcare [34]. This places a heavy responsibility on IS to deliver direct tangible benefits within the NHS.

The strong link that is being made between the introduction of information systems and the improvement in healthcare delivery within the NHS will only come to fruition if proposed methodologies support the introduction of agile, best-in-class, secure and resilient systems that can support and enhance patient care.

Within the context of the study we undertook there is no doubt that in today's dynamic environment, large and complex organizations need a new approach to management in order to avoid a breakdown of traditional IS introduction. Hence, it is imperative that it is understood that dynamic IS introduction cannot really be identified too far into the future. There are a few reasons for this which include the following:

- The most basic reason is the demand for a projection of the systems that it is assumed will influence future business strategy. Often this is adopted at the expense of the organization creating dynamic project environments.
- IS planning really has to be based on a dynamic and evolving model that effectively supports flexible management decision-making processes.
- Organizations must avoid the temptation to focus on information capture issues while underestimating the major challenges involved in leveraging the value of this information. In particular, a large and growing gap has emerged between the amount of information actually captured or readily available for capture and the actual use of this information to create economic value. Systems barriers, skill barriers and organizational barriers are all responsible for this gap. The availability of even more information about consumers in online environments offers the potential to widen this gap even further.

This research has focused on the issue of introducing IS in complex organizations such as the NHS. Outcomes from the five NHS sites suggest that the information introduction strategy within the NHS is not as flexible as desired. The article has also highlighted the need to appreciate the significant difference between introducing and deploying a system. Fundamentally, a system can be *deployed* with practically minimal or no involvement of the customer; however, for systems *introduction*, a different strategy is required as this can only be successful with the help of those it will benefit, namely the customers. This is the fundamental difference between the two.

It is also not surprising to highlight that outcomes from the interventions were reiterated years later in the National Audit Commission report [35] on the Unfit in the NHS. This highlights that the programme continues to experience significant challenges, especially related to ensuring not only that IT suppliers continue to deliver systems that meet the needs of the NHS within agreed timescales, but also that the NHS wins the support of staff and the public in making the best use of the systems to improve services.

This research has been a ground-clearing exercise undertaken in a large, complex organization undergoing major change. The interventions undertaken at the five sites have revealed a seemingly chaotic situation existing within the NHS in relation to its introduction of IS.

Limitations

It is difficult in the IS and technology area to choose a research theme that has currency over several years. In particular, there is a possibility that the IS environment has changed sufficiently for the research to be viewed as *historical*. This would not, however, render the research inappropriate as we believe that there are considerable lessons that make the article still very relevant.

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